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## FOUR NEW RODENTS FROM COSTA RICA

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In the preparation of a report on the mammals of Costa Rica I find it necessary to recognize a new race of the spiny pocket mouse of the *Heteromys desmarestianus* group from the central highlands, a new race of *Macrogeomys heterodes* from the Reventazon River Valley region, a new race of *Macrogeomys cavator* from the Caribbean watershed and a new race of the small white-crowned *Macrogeomys cherriei* from north central Costa Rica on the San Carlos River watershed.

For the loan of comparative material I am indebted to the U. S. National Museum, Field Museum of Natural History, the Museum of Comparative Zoölogy, Cambridge, and the Museum of Zoölogy at the University of Michigan. I am also indebted for the advice given me by Major E. A. Goldman who compared the *Heteromys* with the Costa Rican types in Washington.

Dr. W. H. Burt has kindly given me his consent to publish on the type in the University of Michigan collection.

### *Heteromys desmarestianus* underwoodi, new subspecies

TYPE.—No. 131729, Amer. Mus. Nat. Hist.; adult ♂; Escazu, Prov. San Jose, Costa Rica, a small town seven miles southwest of San Jose, about 5000 feet elevation. Collector, C. F. Underwood, April 28, 1938. The type is a skin and skull in good condition. Besides the type there are four adult specimens from Los Higuerones, Escazu, 4500 feet, that are near topotypes.

GENERAL CHARACTERS.—A small, relatively light-colored spiny pocket mouse with large ears, tail longer than head and body, closely allied to other described forms of the *desmarestianus* group; noticeably smaller than *H. d. planifrons* and *H. d. subaffinis*. Somewhat similar to *H. d. repens* of the mountains of western Panama but smaller and paler in color; white of underparts more extensive, buffy lateral line usually present, ears larger; cranial details, including

broad rostrum, small braincase, relatively short nasals and short interparietal, distinctive.

DESCRIPTION.—Color of type: upperparts about mummy brown, the spines blackish mixed with fine cinnamon buff hairs; outer side of hind limbs slaty gray; outer side of fore limbs buffy gray; ears dark mummy brown with a narrow white margin; tail mummy brown above, entire under side white; underparts, including fore and hind feet to well above wrists and ankles, under sides of fore and hind limbs, chin, lips to above nostrils, pure white to roots of hair; buffy lateral line indistinct in the type; four specimens in the type series collected in September have the cinnamon buffy hairs predominant and a buffy lateral line well defined. Skull, small and narrow; superior outline moderately rounded; supraorbital ridges strongly developed as protecting shelves; interparietal short and extended transversely; nasals conterminous with premaxillae posteriorly; rostrum slender, evenly tapered anteriorly from zygomata; braincase narrow; bullae small but well inflated; teeth small.

Measurements of type (one male and three females from Los Higuerones in parentheses): head and body, 129 mm. (122, 122, 139, 132); tail vertebrae, dry, 155 (165, 155, 144, 155); hind foot, 30, dry 32 (35, 36, 35, 35). Skull: greatest length, 34.5 (35.3, 35, 34.8,—); zygomatic width, 15.6 (16, 16.1, 16,—); interorbital width, 9.5 (9.5, 9.4, 9.0,—); length of nasals, 13.8 (14.5, 14.1, 14.5,—); width across squamosals, 14.8 (15, 14.7, 14.5, 14.6); interparietal,  $8.8 \times 4$  ( $9.2 \times 4.9$ ,  $9 \times 4.5$ ,  $9.1 \times 4.3$ ,  $9.2 \times 4.3$ ); width of braincase across ridges, 13.6 (13.8, 13.9, 13.5, 13.3); alveoli of upper molar series, 5 (5, 5, 4.7, 4.7).

*Heteromys d. underwoodi* is a small race of the *desmarestianus* group, noticeably smaller than the two closely allied forms, *H. d. planifrons* from the western lowlands and *H. d. subaffinis* from the eastern lowlands of Costa Rica. The skull is also smaller than that of either with a more evenly tapered rostrum. It approaches *H. d. repens* in the form of the rostrum but differs from the latter in smaller size, more strongly developed supraorbital and temporal ridges, relatively narrower inter-

orbital region, narrower braincase, smaller bullae and much shorter and broader interparietal. In *underwoodi* the occipital plane is flat and nearly perpendicular, whereas in *repens* the supraoccipital is strongly inflated and extended posteriorly so that it overhangs the foramen magnum.

Escazu is about 3700 feet. The type, according to Mr. Underwood, was collected above the town at an altitude between 5000 and 5500 feet, in humid virgin country that is interspersed with patches of maize as well as clearings for cattle.

**Macrogeomys heterodus cartagoensis,**  
new subspecies

TYPE.—No. 139268, Amer. Mus. Nat. Hist.; adult ♂; Paso Ancho, Prov. Cartago, Costa Rica, a small town between Cartago and Pacayas, east of the divide and on the Atlantic watershed, elevation about 4800 feet. Collector, C. F. Underwood, January 4, 1941. Besides the type there are twenty-two topotypes.

GENERAL CHARACTERS.—A moderately large blackish pocket gopher similar in general external characters to *heterodus* and *dolichocephalus* but smaller than either and differing from each in distinctive cranial characters.

DESCRIPTION.—Color of type in fresh pelage: upperparts uniform dark mummy brown; chin, wrists and small anal patch, creamy white; an irregular albinistic area on underparts between forearms; rest of underparts mummy brown, very little paler than back; tail naked, flesh colored. In the series of topotypes the color of underparts varies from mummy brown to smoke gray; in worn faded pelage, buffy, contrasting with the dark color of back. Skull comparatively small and relatively narrow, rostrum moderately long, shorter than in *dolichocephalus*, relatively longer than in *heterodus*; nasals slender, evenly wedge-shaped, zygomatic arches spreading, their sides more nearly parallel than in either *heterodus* or *dolichocephalus*; the maxillary branches of the zygomata slope strongly backward, jugal broad; frontal depressed between the orbits and slightly inflated along margin of orbits; post-orbital processes broad, the anterior border at right angles to axis of cranium; occipital plane flat, with the exception of a low median vertical ridge, and slopes strongly forward. Heel of last upper molar long and narrow and appreciably longer than half the total length of this tooth.

Measurements of type (the largest male and female topotypes in parentheses): total length, 350 mm. (335, 360); length of tail, naked part, in dry skin, 59 (61, 80); hind foot, after dampening, 47.5 (48, 49). Skull: condylobasal length, 65.5 (67.6, 65.5); basal length, 61.5 (63.4, 60.2); basilar length, 56.5 (58.4, 55.5); greatest

width across squamosals, 38.5 (40.9, 39); zygomatic width, 39.7 (42.4, 39); least width between postglenoid notches, 28.5 (29.2, 27); interorbital width, 9.1 (10, 10.9); diastema, 25.3 (27.2, 25); width of rostrum in front of zygomata, 15.1 (16, 14.8); alveoli of upper molar series, 14.4 (14.7, 14.4).

The pocket gophers of the *Macrogeomys heterodus* group are separable into three races. Peters' type of *heterodus* is without exact locality, and while a type locality has not been fixed it seems a reasonable assumption that it came from an accessible part of Costa Rica. None in the large series from San Ramon Tres Rio or Cartago, east of the divide, is sufficiently close in cranial measurements to the type to be considered typical. On the other hand an adult female from Escazu, eight miles southwest of San Jose on the Pacific watershed, is identical in cranial measurements, especially in the remarkably short rostrum and broad skull. Measurements of Peters' type (female?, in parentheses) and an adult female and adult male from Escazu: total length, 380, 392 mm.; tail, 70, 80; hind foot, 48, 52; condylobasal length, (61), 61.5, 69; basal length, (58), 57.5, 64.8; basilar length, (51.2), 52.4, 59.7; breadth across squamosals, (38), 37, 39.5; breadth between postglenoid notches, (27.5), 28, 31.4; zygomatic width, (—), 41.3, 47.3; diastema, (22.5), 22.7, 27.5; alveoli of upper molar series, (14), 14.5, 15.5. The type of *dolichocephalus* collected in 1866 is labeled San Jose. Mr. Underwood tells me that he never heard of pocket gophers being taken at San Jose. Specimens from the upper San Carlos Valley, especially around Zarcero, are typical, having relatively narrow skulls with a long rostrum and long nasals, and are the largest of the group.

*Macrogeomys h. cartagoensis* occupies the Reventazon Valley on the north side of the river and probably the slopes of the Volcan Irazu. It is the smallest race of the *heterodus* group and intermediate in many respects between the typical form and *dolichocephalus*. The elongation of a narrow heel on the last upper molar in *cartagoensis* is carried to extreme, whereas in *heterodus* it is short and broad, and moderately long and broad in *dolichoceph-*

*alus*. The largest specimens of *cartagoensis* approach *heterodus* in the length of the skull, but the zygomatic width is considerably less than in the typical form, and the rostral length is relatively longer.

Specimens from San Ramon Tres Rios, just over the divide, are considered referable to *cartagoensis* though not typical, as are the specimens from Irazu, Peralta and Cervantes.

### *Macrogeomys cavator nigrescens*, new subspecies

TYPE.—No. 67536, University of Michigan Museum of Zoölogy; adult ♂; El Muñeco (Rio Navarro), ten miles south of Cartago, Prov. Cartago, Costa Rica; altitude 4000 feet, Caribbean rain forest, January 22, 1933; collector, Austin Smith. The type is a skin in good condition and skull with most of one zygomatic arch and rear part of skull on one side missing; rest of skull, excepting bullae, intact. Besides the type there are five topotypes: a female in fair condition, a subadult male in good condition, one male with a fragmentary skull and two immature.

GENERAL CHARACTERS.—A large, dark, uniform-colored pocket gopher with blackish feet and tail; closely allied to *Macrogeomys cavator* from the Volcan de Chiriqui, Panama, but darker in color. Cranial characters, including long rostrum, broad nasals, slender zygomatic arches and long hour-glass braincase, distinctive.

DESCRIPTION.—Color of type: upperparts uniform dark fuscous, the hair coarse and woolly; the entire underparts, with the exception of a small buffy anal patch and light colored hairs around the mouth, are sparsely covered with rather short dusky hairs, little paler in color than back and mixed with a few scattered longer pale buffy hairs; fore and hind feet naked, blackish brown. Skull, relatively long and slender; rostrum long; nasals wedge-shaped and broadly truncate posteriorly; zygomatic arches short, slender and squarely spreading anteriorly, the anterior maxillary branches especially narrow at the premaxillary and frontal sutures; interorbital area narrow, strongly depressed along median line, raised in ridges along borders of orbits and inflated anteriorly; braincase small, long, narrow, well inflated and hour-glass shaped; lambdoid crests strongly developed, occipital plane sloping slightly forward with a low vertical central ridge. Molar teeth normal, last upper molar with an elongate broad heel.

Measurements of type (an adult female and a semiadult male? topotypes, in parentheses): total length, 390 mm. (367, 361); tail vertebrae, 100 (104, 99); hind foot, 53 (51, 48). Skull: condylobasal length, 66.5 (—, 64); basal length, 63.1 (—, 60); basilar length, 57.7 (—, 55.5); length of nasals, 26.5 (23.3, 25.4); diastema,

26.5 (24.5, 24.2); interorbital width, 9.4 (8.9, 8.5); zygomatic width, 43 ? (39.5, 36.9); width between postglenoid notches, 30.4 ? (28.3, 27.8); width across squamosals, — (38.3, 37); width of rostrum in front of zygomata, 15.5 (14.3, 14); alveoli of upper molar series, 15.1 (15.5, 16); tip of nasals to back of upper occipital ridges, 65.5 (61.6, 63.3).

*Macrogeomys c. nigrescens* requires no close comparison with members of the *heterodus* group, which are soft-furred and have flesh-colored tails. It closely resembles typical *cavator* in external appearance but is differentiated from the latter in having a relatively longer and more slender skull, longer rostrum, more broadly truncate nasals; slender, shorter and more squarely spreading zygomata; broader jugal, smaller, more rounded, and considerably longer braincase, resulting in a straighter and more perpendicular occipital plane and a relatively longer occipitonasal length. The interorbital region is narrower in *nigrescens*, the depression is deeper and extends further posteriorly than in *cavator*, and the postorbital processes are less strongly developed and slope backwards instead of extending squarely from the axis of the skull. These characters are apparent through the series, representing all ages.

### *Macrogeomys cherriei carlosensis*, new subspecies

TYPE.—No. 141944, Amer. Mus. Nat. Hist.; adult ♂; Cataratas, San Carlos, Prov. Alajuela, Costa Rica, a small town on the San Carlos River, about 400 feet elevation. Collector, C. F. Underwood, May 4, 1942. The type is a skin and skull in good condition. Three specimens in Field Museum from Villa Quesada are referable to this new race.

GENERAL CHARACTERS.—A small blackish brown pocket gopher with a large symmetrical white area on top of head, and all four feet and tail naked; similar in general characters to *Macrogeomys cherriei* and *costaricensis* but white area larger, general color darker, tail longer, and differing in distinctive cranial characters.

DESCRIPTION.—Color of type in fresh pelage: upperparts uniform dark mummy brown with the exception of a white patch on head extending from between eyes to behind ears; underparts, dark mouse gray; tail naked, blackish brown in dried skin. Skull, broad with a slender rostrum; anterior border of zygomata nearly at right angles to axis of skull; jugal broad, broadest in middle; nasals long, slender and tapered sharply backward to a narrow emarginate border, the posterior width being less than

one-third of the anterior width. Occipital plane, somewhat wedge-shaped, inflated with a narrow median vertical ridge and slopes forward.

MEASUREMENTS.—Type (and an adult female from Villa Quesada in parentheses): total length, 323 mm. (300); tail vertebrae, 88 (83); hind foot, 41 (40). Skull: condylobasal length, 58.5 (55); basal length, 55 (51.6); basilar length, 50 (47); width across squamosals, 33.7 (30.1); width between postglenoid notches, 26.1 (24.6); zygomatic width, 39.2 (36.6); interorbital width, 8.7 (9.5); width of rostrum in front of zygomata, 12.7 (12.6); length of nasals, 23.4 (22.5); greatest width of nasals anteriorly, 9.4 (7.9); least width of nasals posteriorly, 3 (3.1); alveoli of upper molar series, 13 (12.1); diastema, 22.7 (20.5).

*Macrogeomys c. carlosensis* is similar in external characters to *cherriei* and *costari-*

*censis* but can readily be distinguished from both of these forms by its squarely spreading zygomata, slender rostrum and long, narrow, sharply tapered nasals which extend posteriorly to between the anterior roots of the zygomata. In *cherriei* the zygomata is evenly bowed and the anterior border slopes strongly backward, the rostrum broad, nasals broadly wedge-shaped and the posterior border truncate and more than half the greatest anterior width. In *costaricensis* the zygomata is squared, but the sides are nearly parallel, rostrum broad, nasals truncate and very broad posteriorly, their sides in some individuals nearly parallel.